Southwest & Northwest Fisheries Science Centers' Review of Science on Marine Mammals & Turtles

Response to Panelists' Comments and Suggestions

15 October 2015

Background

NOAA Fisheries works to conserve, protect and recover species under the US Endangered Species Act (ESA) and the US Marine Mammal Protection Act (MMPA). On 27-31 July, 2015, the Southwest and Northwest Fisheries Science Centers (SWFSC and NWFSC, respectively) hosted a panel of experts to review the marine mammal and turtle science conducted by these two centers. These experts were:

- Dr. Frances Gulland (Chair), The Marine Mammal Center, USA;
- Dr. Scott Baker, Oregon State University, USA ;
- Dr. Phil Clapham, Alaska Fisheries Science Center, NOAA, USA;
- Dr. Selina Heppell, Oregon State University, USA ;
- Dr. Bonnie Ponwith, Southeast Fisheries Science Center, NOAA, USA ;
- Dr. Lorenzo Rojas-Bracho, Coordinación de Investigación y Conservación de Mamíferos Marinos (CICMM) Instituto Nacional de Ecología y Cambio Climático (INECC), C/O CICESE, Ensenada, México.

This review was the fourth in a series of annual reviews, conducted on a different theme each year over a five-year cycle, designed to maximize the transparency and effectiveness of major science programs located at the six Science Centers as well as those located in or coordinated through NOAA Fisheries' Office of Science and Technology. This review cycle focused on science conducted to support management of species under the ESA and MMPA mandates. In order to provide a more focused review and to reflect our programmatic structure, the Centers divided the review into two parts. The first was a review of ESA-listed West Coast Protected Fish Species held in Seattle https://swfsc.noaa.gov/2015WestCoastProtectedFishReview/, and a second review discussed in this document, held July 27-31 at the SWFSC in La Jolla, California, that focused on marine mammal and turtle science (https://swfsc.noaa.gov/2015ProtectedMammalTurtleReview/).

Acknowledgements

We would like to thank the review panelists who devoted a significant amount of time to prepare for, and participate, in this review. Their observations and recommendations provide valuable feedback on a complicated and diverse science program. We would like to express our appreciation to the Centers' staff for their contributions, insights, and candor during this three-day review. Preparing for such a review is a tremendous amount of work, particularly when coordinated across two science centers, and our staff did a tremendous job.

Charge and Review Structure

The Panelists were asked to address five overarching questions:

1. Do current and planned protected species scientific activities fulfill mandates and requirements under the ESA and MMPA, and meet the needs of the regulatory partners?

2. Are there opportunities to be pursued in conducting protected species science, including shared and collaborative approaches with partners?

3. Are the protected species scientific objectives adequate, and is the best suite of techniques and approaches to meet those objectives being used?

4. Are the protected species studies being conducted properly (survey design, statistical rigor, standardization, integrity, peer review, transparency, confidentiality, etc.)?

5. How are advances in protected species science and methodological approaches being communicated and applied in NMFS?

The review presented science categorized into five themes:

I – Abundance Estimation and Trends

II – Defining Units to Conserve

III – Science to Support Recovery of Southern Resident Killer Whales (SRKW)

IV – Life History and Condition

V – Risk Assessment

Four of these (Themes I, II, IV, and V) were presented exclusively by scientists of the Marine Mammal & Turtle Research Division (MMTD) of the SWFSC and the fifth (Theme III) was primarily presented by scientists from the Conservation Biology and Environmental and Fisheries Science Divisions of the NWFSC (with a single presentation from MMTD-SWFSC).

Additional details of the review, including the full review Terms of Reference, presentations, and supporting materials can be found at https://swfsc.noaa.gov/2015ProtectedMammalTurtleReview/

Synthesis of Panel Comments and Recommendations, and Response

The panel structured its comments into those that cut across all five themes, and those that were theme-specific. We will carefully consider all of the specific comments, but focus especially on responding to the major comments summarized below. Some of the Panel's comments pertained to the Centers' research on mammals and turtles in the context of their roles in ecosystems. We will not address these here, as this science will be reviewed in 2016 under that year's theme of "Ecosystems". The Ecosystem Science reviews are presently scheduled for April 2016 for the SWFSC, and for June 2016 for the NWFSC.

The Impact of Level Funding

Many of the panel recommendations were largely outside of Division, and even Center control, in that they focused on the significant impacts of level budgets (inability to travel for professional meetings and maintenance of collaborations, limitations in the ability to recruit new talented staff as senior leaders

retire, waning support for the molecular tissue collection, increasing reliance on partners for science implementation funds resulting in challenge of maintaining a focus on NMFS's science mission as opposed to that of funders', loss of support for proactive and innovative science, need for new bioinformatics/data management, education and outreach staff, reliance on graduate students and post-docs to an increasing degree for analytical expertise). This theme was mirrored by comments from all six reviewers.

Indeed, a pervasive concern for our science enterprise that manifests itself in many ways (articulated by the review panel), is level funding for too long. The panel was strongly supportive of priorities and methods of achieving related objectives presented by the Centers. Adjustments to base are the single most significant change that could positively influence our science, and we hope that some mechanism might be found to alleviate the situation somewhat.

Several action items to address level budgets *are* within our control, some of which were directly or indirectly recommended by the reviewers. These include:

- *Evaluate critical research needs that are not being addressed due to lack of funding, personnel, or infrastructure;*
- *Continue to allow attrition through selective non-replacement of retiring scientists to manage restricting budgets;*
- *Continue to strengthen existing partnerships and create new ones with a goal of identifying common information needs and leveraging funds, expertise, and infrastructure;*
- *Continue to aggressively seek external (non-base) funds in a way that complements ongoing core work;*
- *Continue MMTD's annual budget planning ("Go-Hold-No Go") exercise, as it appears to be serving the SW Center well, especially when there is representation from the NOAA Fisheries management side to reflect their highest science priorities as well;*
- *Continue regular discussions with the WCRO regarding research priorities for the SRKW program;*
- *Establish a routine maintenance plan for the full inventory of mission-critical instruments and hold resources in reserve to execute it and cover repairs in the event of a breakdown;*
- *Continue strong partnerships with academia to garner funding avenues and intellectual "freshness";*
- *Approach science needs at an agency level to maximize efficiencies, avoid duplication, and focus expertise and infrastructure on highest priorities (e.g., develop a national prioritization of species for stock/distinct population segment characterization; propose a holistic approach to maintaining tissue collections and the infrastructure that is necessary to support them);*
- *Conduct a scoping meeting to work with other science centers and NMFS HQ leadership to rename the SWFSC mammal & turtle collection as the national and international resource that it is and to develop a proposal to secure the archiving of all marine mammal tissues nationally.*

The Importance of Time Series

A general theme of observations that translated into recommendations from all six reviewers pertained to strong support for maintenance of time series. Accordingly, the Centers will:

- *Maintain time series. Though funding-dependent, we will maintain our existing abundance and trends time-series based on data collection from aerial surveys, shore-based platforms, and small vessels, including gray whale abundance and calf reproduction surveys, pinniped aerial surveys, harbor porpoise aerial/acoustic monitoring, marine turtle monitoring surveys, and the annual SRKW census;*
- *Continue to push forward the NOAA Fisheries' rotating Multispecies Cetacean & Ecosystem Assessment Surveys proposal, thereby securing regular ship-based surveys of oceanic regions of responsibility and ensuring time series of abundance, distribution, population structure, health and condition. Work with agency to ensure that existing ship-time is not lost due to shortfalls in ship readiness or staff availability;*
- *Seek funding to resurrect large whale and coastal bottlenose dolphin photo-identification efforts;*
- *Partner with the agency (NMFS) to develop an integrated, agency-wide program for marine protected species sample archiving that is supported at a national level to decrease the financial burden on SWFSC of maintaining the collection.*

Innovative Technologies

Panelists were impressed with the development and implementation of innovative technologies presented. Following reviewer recommendations, the Centers will:

- *Continue to conduct research and monitoring related to body condition, reproduction, growth and survival of turtles and marine mammals in general, and in Southern Resident Killer Whale (SRKW) health and condition research with Unmanned aircraft systems (UAS) in particular; continue to seek funds to support this research; work to streamline the permitting process for scientific use of UAS in US waters;*
- *Increase investment in computerized technology and novel skill sets for gray whale assessments;*
- *Continue development of novel molecular markers/techniques to address marine mammal and turtle population structure, habitat preferences, and migration patterns;*
- *Continue development of remote endocrine assessment tools through blubber and breath hormone and metabolite assessments and collection of marine turtle tissues;*
- *Continue to improve and develop quantitative fecal DNA diet assessment of SRKW.*

Maintaining Scientific Excellence

The scientific expertise and influence of staff was widely noted. In the face of level funding, panelists were also concerned about the ability to maintain such excellence into the future, particularly in MMTD-SWFSC, where most of the region's mammal and all of the turtle expertise resides. In response to recommendations along these lines, the Centers will:

- *Refine existing staffing plans to address succession planning for key senior individuals expected to retire in the near future;*
- *Continue to strive to allow all scientists to attend at least one scientific meeting per year, and provide some funding to support travel for post-docs and students;*

- *Develop a systematic approach to applying for external funds including mentoring young scientists on how to write proposals and target funding;*
- *Continue to ensure that the portfolios of research scientists include an appropriate blend of operational science and question-based research;*
- *Backfill the current MMTD data manager vacancy;*
- *Invest in staff with quantitative ecological expertise and field experience to integrate life history data with population dynamics and risk assessment .*

Strengthening existing research areas and moving into new ones

Finally, in response to particular observations/recommendations from individual reviewers and/or pertaining to specific themes, the Centers will:

- *Continue to conduct research focusing on the transition from "Endangered" to roles in ecosystems for recovering populations of protected species. We will particularly (continue to) focus on the role of top-down forcing (e.g., killer whales as predators that influence population dynamics of large whales, pinniped-killer whale-salmon interactions). We will also increase our focus on historical reconstruction of exploited species (where are they with respect to historical numbers and are they greater in abundance than ever before?);*
- *Continue to develop species-specific predictive distribution models, including those outside the California Current region, for use in assisting survey design and assessing anthropogenic risk;*
- *Continue to provide support for development of a strategy to conserve marine mammal and turtle populations that are not yet in imminent danger of extinction, but may be if not protected soon [through ongoing engagement/leadership in various national and international fora, e.g., International Whaling Commission, International Union for the Conservation of Nature, Society for Marine Mammalogy];*
- *Revise abundance estimates and trends of U.S. cetacean stocks per Barlow (2015) and Moore and Barlow (2014);*
- *Revise abundance estimates and trends of eastern tropical Pacific depleted dolphin stocks taking into consideration new analytical methods (e.g., Barlow 2015, Moore and Barlow 2014, Gerrodette unpublished);*
- *Revisit existing list of ETP-related research projects in progress and encourage completion of those most relevant to management implications, especially those focused on impacts of chase and encirclement on stress and reproduction;*
- *Write a synthesis volume of the SWFSC's eastern tropical Pacific research program;*
- *Continue to collaborate with the SWFSC's Fisheries Divisions on research pertaining to council-related activities focused on bycatch mitigation;*
- *Use existing habitat models to more directly predict responses to climate change;*
- *Continue to support Mexican marine mammal science programs for trans-boundary issues of critical conservation importance ;*
- *Work with the West Coast Region and the Office of Protected Resources to identify potential funding sources for southern resident killer whale health assessments, including increased use of photogrammetry and expanded analysis of biopsy samples;*

- *Continue to seek internal and external funding for continuation of studies southern resident killer whale distribution, habitat use, and diet;*
- *Increase collaboration between the southern resident killer whale program and the SWFSC endocrine laboratory;*
- *Review stranding protocols to ensure that maximum information is being collected.*

Summary of Action Items

Theme	Action item	Schedule
All	1. Evaluate and document critical research needs that are not being addressed due to lack of funding, personnel, or infrastructure	i. 2016 – SW and NWFSC Strategic Science & Implementation Plans (and annually thereafter) ii. Fall 2016 - MMTD's three-year science plan (annual updates thereafter) iii. Spring/Summer 2016 - PR Board's List of Protected Species Science Needs (annual updates thereafter)
All	2. Develop a three-year MMTD staffing plan to address emerging issues/growth areas, plan for succession, and manage restricting budgets	Winter 2016
All	3. Continue MMTD's annual budget planning exercise to allow for proactive implementation of highest priority science projects and to include a routine maintenance plan for the full inventory of mission-critical laboratory infrastructure	Fall 2016 (Annually thereafter)
All	4. Develop a proposal for an integrated, agency-wide program for marine mammal and turtle sample curation, with special focus on tissues that are used for molecular research (genetics, hormones, stable isotopes)	Winter 2016
All	5. Publish as a NOAA Technical Memorandum "A Proposal for Multi-species Cetacean & Ecosystem Assessment Surveys" – in collaboration with staff from other science centers and Office of Science and Technology	Spring 2016
All	6a. Maintain time series (Gray Whale Calf Production and Abundance Surveys; California Current Cetacean & Ecosystem Assessment Surveys; Pinniped Abundance and Diet Surveys;	6a. Fall 2015 (loggerhead turtle survey, warm-water years thereafter; leatherback turtle survey, every 3 yrs thereafter);

	Green, Loggerhead, and Leatherback turtle Ecological Surveys, SRKW Census) 6b. Strive to resurrect discontinued time series by conducting scoping meetings with Scripps Institution of Oceanography, US Navy, and BOEM to strengthen collaboration and partner on funding for Mark-Recapture Abundance Surveys for baleen whales and coastal bottlenose dolphins	Winter 2016 (gray whale abundance, back-to-back years every 5 yrs thereafter; pinniped diet surveys, quarterly thereafter; SRKS census, annually thereafter); Spring 2016 (gray whale calf production, annually thereafter; pinniped abundance, annually thereafter); Summer 2016 (green turtle survey, annually thereafter); Fall 2017 (California Current Cetacean & Ecosystem Assessment Surveys, back-to-back years every 4 yrs thereafter) 6b. Summer 2016 *Note that virtually all are dependent on non-base funding.*
All	7. Invest in personnel and infrastructure (UAS platforms; imaging systems; hardware and software for data analysis; hormone assay, stable isotope, and molecular genetic laboratory equipment and supplies) to conduct research using innovative technology, especially (7a) UAS-based work using photogrammetry to assess health and condition; (7b) thermal imaging systems to assess abundance; (7c) hormone assays to assess health and condition; (7d) next generation molecular techniques to clarify stock structure and diet; (7e) stable isotopes to investigate ecology	Winter 2016 (thermal imaging); Spring 2016 (UAS-based work; Throughout fiscal year 2016 (hormone assays, molecular techniques, stable isotopes) *Note that virtually all are dependent on non-base funding.*
All	8. Strive to allow all scientists to attend at least one scientific meeting per year	December 2015 (Biennial Conference on the Biology of Marine Mammals); February/March 2016 (International Sea Turtle Society Meeting) *Funding-dependent*
All	9. Conduct research focused on recovering populations, and their influence on marine ecosystems, especially top-down forcing and its influence on marine ecosystems	Winter, Spring, Fall 2016 (Influence of killer whale predation on prey populations); Quarterly 2016 (California Sea Lion diet sampling)
I	10. Revise abundance estimates and trends of current cetacean stocks in the California Current to account for new analytical methods	Summer 2016

I, II, IV, V	11. Revisit existing list of eastern tropical Pacific-related research projects in progress and encourage completion of those most relevant to management implications, especially those focused on impacts of chase and encirclement on stress and reproduction	Winter 2016
I, II, V	12. Use existing habitat models to more directly predict responses to climate change	Fall 2017
I, II, IV, V	13. Support engagement/leadership in fora (national and international) to develop strategies to conserve marine mammal and turtle populations that are not yet in imminent danger of extinction	Throughout fiscal year 2016
III	14. Discuss potential collaborations with SWFSC endocrine laboratory	Winter 2016
III	15. Pursue opportunities for funding through SeaWorld Killer whale research fund	Completed for 2015
III	16. Implement recommendations of 2015 health assessment workshop	Ongoing
III	17. Continue study of SRKW location and habitat use through tagging and passive acoustic recorders to further understand habitat use, distribution in winter, prey needs and habitat overlap with northern resident killer whales.	Funded through 2016